Julianstown R132

Preliminary Business Case

Prepared for: Meath County Council

Date: December 2018

Prepared for:

Meath County Council as a *'Preliminary Business Case'* for the R132 Julianstown Traffic Alleviation Project. This report is compliant with Common Appraisal Framework standards and Circular RW 06/2018,

Prepared by:

Catherine Murray

Assistant Director - Economics

T: (+353) 01 238 3173

M: (+353) 87 348 3138

E: catherine.murray2@aecom.com

T: (+353) 01 238 3100

www.aecom.com

Quality Information

Revision History

Table QI.1: Revision History

Revision	Revision Date	Details	Name	Positions
V.01	20/12/2018	Draft	Catherine Murray	Associate Director
V.02	21/12/2018	Draft	Catherine Murray	Associate Director

Quality Control

Table QI.2: Quality Control

Prepared By:	Checked By:	Approved By:
-	-	-
Catherine Murray	Philip Shiels	Shane Dunny

Executive Summary

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Executive Summary

This report presents the *'Preliminary Business Case'* for the proposed Julianstown Bypass and satisfies the Stage 1 Pre-Appraisal/Preliminary Appraisal requirements of the DTTaS Common Appraisal Framework (2016). The purpose of investing in a relief road is to:

- Alleviate the impact of high level traffic demand travelling through Julianstown village, which currently has an Average Annual Daily Traffic (AADT) count of over 20,000 vehicles
- Improve safety conditions for all road users, but particularly for active modes of transport (pedestrians and cyclists) and mobility within the village
- Contribute to health benefits, with reductions in air pollution, vibration and noise
- Reduce journey time on the R132, thereby increasing journey time reliability
- Improve resilience of the transport network in north-east Meath, given the likely increased future demand on transport networks.

A bypass was not the only solution explored in this analysis. Four solutions or options were assessed, along with a 'do nothing' scenario;

- Option 1: a 'do nothing', or baseline scenario/option
- Option 2: east-west distributor road to the south of Drogheda
- Option 3: local bypass of Julianstown
- Option 4: new link road from the M1 to the R132 north of Julianstown
- Option 5: investment in other transport modes.

It should be noted that this preliminary business case relies on traffic modelling that AECOM undertook in 2015 following a request from Meath County Council to examine the impact of potential solutions to the traffic volumes in Julianstown. Should the scheme progress an update of the traffic modelling task will likely be required. Our analysis suggests that there is a *primae facie* case for 'doing something' to address the traffic volumes in Julianstown, with positive benefit to cost ratios for all the road construction options, ranging from a low estimate of 1.56 when calculated for 30 years of the road's life to the highest estimate of BCR value of 5.8 for one of the Options, when calculated for 60 years of benefits. These benefits are described as preliminary, taking into account time savings only, and therefore can be considered very conservative.

Option 3, the bypass of Julianstown emerged as the preferred option in both the Multi-criteria Analysis and preliminary cost benefit analysis, although it should be noted that the public transport investment option was not fully costed at this time.

Table 1. Summary of Preliminary Multi-criteria Analysis and Cost Benefit Ratio Results

		Options/Scenario				
Category	Criteria Description	I	II	III	IV	V
Economy	**Transport Efficiency and Effectiveness:** Reducing journey times	2	5	7	5	4
	Wider Economic Impacts: Reducing transport costs	3	5	5	5	4
	Transport Reliability and Quality: Improving congestion	3	5	5	5	5
Safety	**Collision Reduction:** Road Safety Authority guidelines	4	5	5	4	4
	Security: Removing safety issues for all road users	3	4	7	5	5
Environment	**Air Quality**: Removes emissions from urban environment	3	5	5	4	5
	Noise and Vibration: Removes noise and vibrations from Village.	2	4	7	5	4
	Landscape and Visual Quality:	3	4	5	4	4
	Biodiversity: Natura 2000 sites, particular habitats.	4	4	4	4	4
	Cultural, Archaeological, Architectural Heritage:	2	4	6	4	4
	Land Use: Impact upon existing land uses	4	3	3	3	3
	Water Resources: Effect on water courses	4	4	4	4	4
Accessibility & social inclusion	**Vulnerable Groups:** access to schools	3	4	6	5	4
	Deprived Geographical Area: n/a	4	4	4	4	4
Integration	**Transport Objectives:** Strategic Connectivity	2	4	3	4	5
	Land Use Integration: Local planning objectives	3	4	5	5	7
	Geographic Integration: Enhanced regional accessibility	3	4	4	4	7
	Integration with other Government policies: Compatibility with wider policy	4	4	5	4	4
Physical Activity	**Opportunities for pedestrian and cyclists**	3	4	5	5	5
Benefit to Cost Ratio	30 Year Appraisal		1.56	3.9	3.35	Not
	60 Year Appraisal		2.25	5.8	4.28	calculated

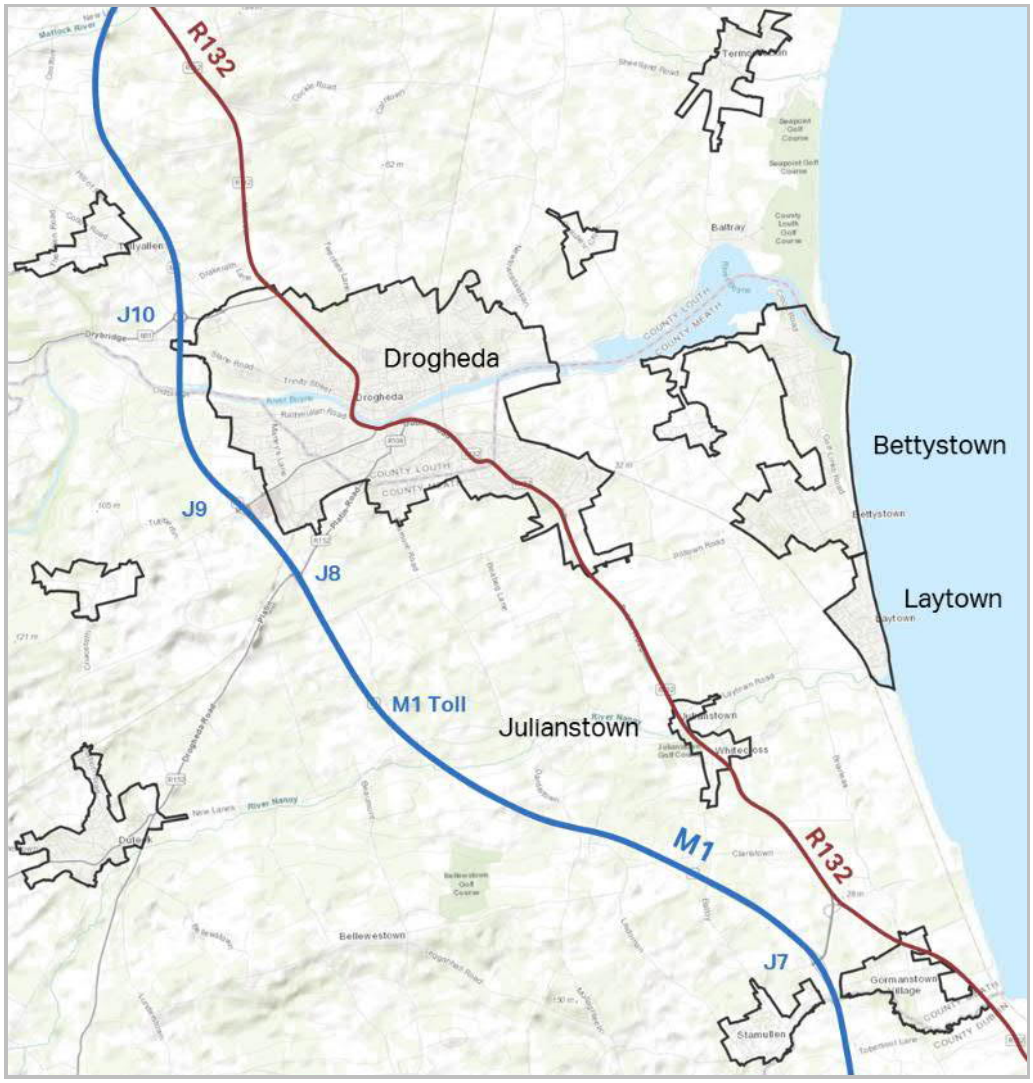
Contents

1. Introduction

Meath County Council wants to resolve the issues arising from high traffic volumes in Julianstown village, to the north east of the county. The Council is determining whether a sufficiently good prima facie case exists for considering a relief road around the village, which emerged as a preferred option in earlier analysis.

A Stage 1 – Preliminary Appraisal of alternative options is required to aid the decision. This involves using multi-criteria to analyse alternative options, as set out in the Public Spending Code and Common Appraisal Framework. We assume the cost of the project is between €5million and €20 million. Note this is an indicative initial project cost range, as no detailed design nor confirmed routes have been selected.

Figure 1. Julianstown and nearby settlements of Laytown, Bettystown and Drogheda

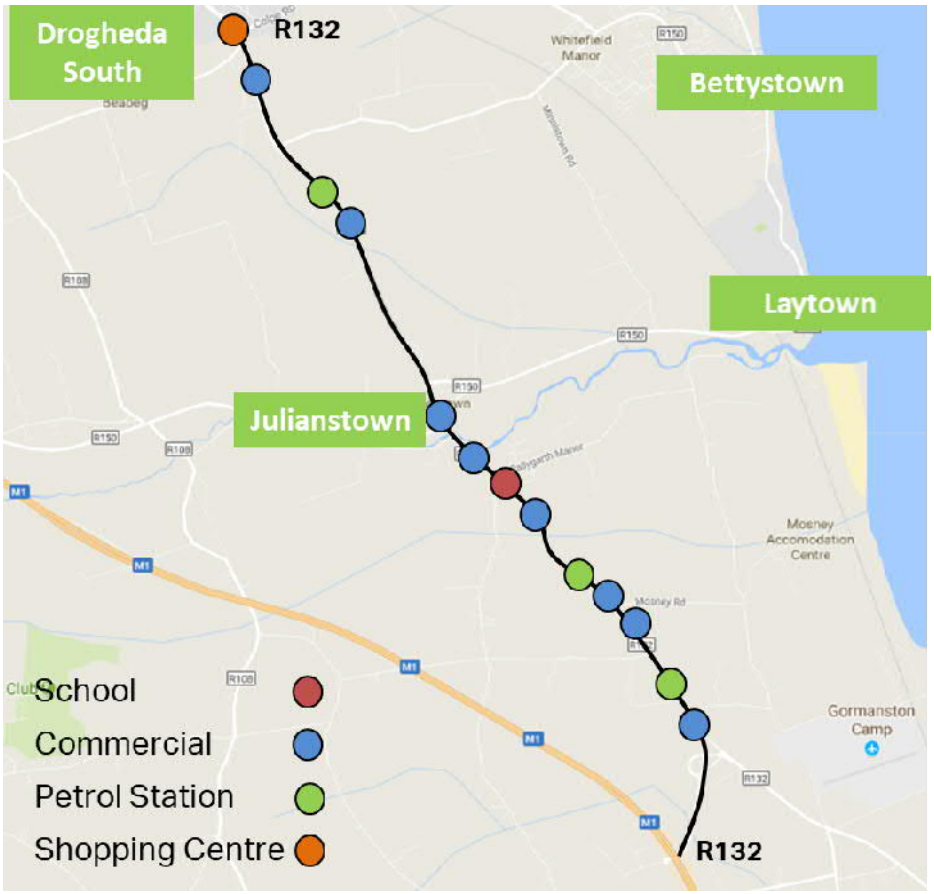


In the Meath County Development Plan (2013- 2019), Julianstown is classed as a commuter village due to its proximity to the large employment areas in Dublin, or other growth town. The following relevant Objectives and Policies specifically addressing transport and mobility in Julianstown are:

- Cultural Heritage OBJ 25 - To support proposals from local communities and community organisations which seek to have a Village Design Statement for a particular village drawn up through a process involving community participation, the Heritage Council and the Council's Planning Department, subject to availability of resources.
- Strategic Policy 1 - To promote the future development of the village as a compact settlement with a pedestrian friendly environment, a legible and coherent physical form, and a variety of land uses and amenities.
- Strategic Policy 3 - To address traffic problems on the R132 Regional Road through Julianstown.
- Movement and Access OBJ 1 – To investigate the effectiveness of, and if appropriate, progress the implementation of, traffic management and traffic calming options and environmental measures through Julianstown village in conjunction with the National Road Authority with a view to providing an enhanced and safer environment for the village.
- Movement and Access OBJ 2 - To improve linkages along the R150 between Julianstown and Laytown including investigating the improvement of cyclist and pedestrian connectivity and facilities between both centres.
- Movement and Access OBJ 3 - To improve linkages along the R132 between Julianstown and Drogheda.
- Movement and Access Pol 1 – To require the provision of short-term on-street vehicle parking where appropriate.

1.1. Background

With a population of 681 people, Julianstown has two main residential estates - Preston Park estate to the north of the village and Ballygarth estate to the south of the village. Whitecross National School is the one primary school, with 450 students. It is located along the R132, to the south of the village. Julianstown has an active voluntary Julianstown & District Community Association. It is a democratically elected representative community organisation, that maintains the village and its environs, governs a village community garden and organising social events. Julianstown village is a designated Architectural Conservation Area, within Volume I of the County Development Plan 2013-2019. The village was chosen by the Heritage Council and Meath County Council as the rural Pilot Project for the national Village Design Statement Programme in 2008. Julianstown has historical and natural heritage, with the river Nanny Estuary and Shore Special Protection Area designated a Natura 2000 site beginning 1 km east of the Village.



1.2. Traffic Volumes in Julianstown

High traffic volumes pass through the R132 at Julianstown on a daily basis. With a population of only 681 people, the Average Annual Daily Traffic (AADT) count of 20,472 in 2018 is high for the size of the village. It is unsurprising, as Julianstown along with Laytown, Bettystown and Drogheda are popular for commuting to Dublin. They form the northern end of "Corridor A", in the Transport Strategy for the Greater Dublin Area 2016-2035. The car mode share for all trip purposes in this corridor is 72 per cent, with public transport at 12 per cent.

Drogheda, County Louth, is the largest town in Ireland, with a population of 40,956 in 2016. Transport demand pressures are increasing. There is a significant amount of population and employment growth planned for south Drogheda, and overall, this corridor between Drogheda to Dublin city centre (including Balbriggan, Swords and North inner-city Dublin) is forecast as having the highest growth in transport demand up to 2025.[1]

The R132 passes through Julianstown, meeting Junction 7 on the M1 approximately 4km south of the village. The R150 traverses the R132 in Julianstown – linking eastward-westward traffic from Duleek (approximately 10km west of the village) to the coastal towns of Bettystown and Laytown.

Increased traffic volume in Julianstown resulted from population growth and the location of the toll booth on the M1 (between Junctions 7 and 8), which opened in 2003. The M1 has taken considerable traffic away from Drogheda Town Centre for through traffic, but the location of the toll booth did not reroute the potential number of vehicles for Drogheda town centre trips. Up to 80 per cent choose to travel via the R132 instead of routing via Junction 8 or 9 where they would pay a toll. Historically, this was the main route south from Drogheda

Average Annual Daily Traffic (AADT) peaked at over 24,666 vehicles in 2002. This fell to 18,946 vehicles in 2004, a drop that can be attributed to the opening of the Dunleer to Dundalk section of the M1 in 2001, and the Drogheda Bypass section of the M1 in 2003. Following the Global Financial Crisis in 2008, a dip in the volumes of traffic is evident, but as the economy rebounded, the traffic volumes have increased to 2005 levels again, with an AADT value of 20,472 for 2018.

[1] NTA, Transport Strategy for the Greater Dublin Area, 2016-2035

Overall, between 2004 and 2018, traffic volume travelling through Julianstown village has been relative static, although the volume observed passing through the M1 toll (between Junctions 7 and 8, north east of Julianstown) during that same period has increased dramatically (Figure 1.1). This demonstrates that the M1 mainline is accommodating the strategic traffic growth across the region. The use of the R132 has remained relatively static as it provides local access to Duleek, Bettystown, Laytown and South Drogheda, accommodating local growth in these areas.

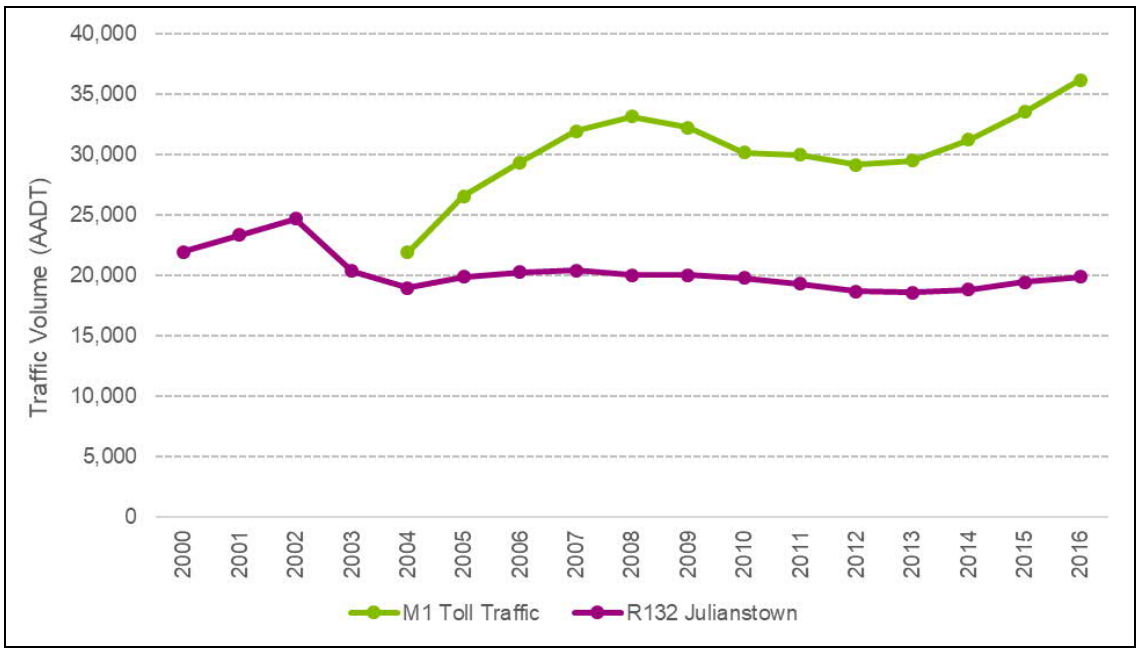


Figure 1.1 Julianstown R132 Average Annual Daily Traffic count and M1 Toll Traffic Data

The volume remains problematic for Julianstown. The R132 is a standard carriageway, with a speed limit of 50km through the village. The staggered crossing of the R150 across the R132 results in significant traffic delays as vehicles travel from eastward to westward direction. The average weekday traffic profile shows total morning and evening peak traffic at 1,600 vehicles per hour. The inter-peak volume is above 1,000 vehicles per hour, indicating constant high volumes of daytime traffic (Figure 1.2). Arguably, the R132 is not fit for purpose, given the large volumes of daily traffic.[2]

[2] Transport Infrastructure Ireland, Design Manual for Roads and Bridges.

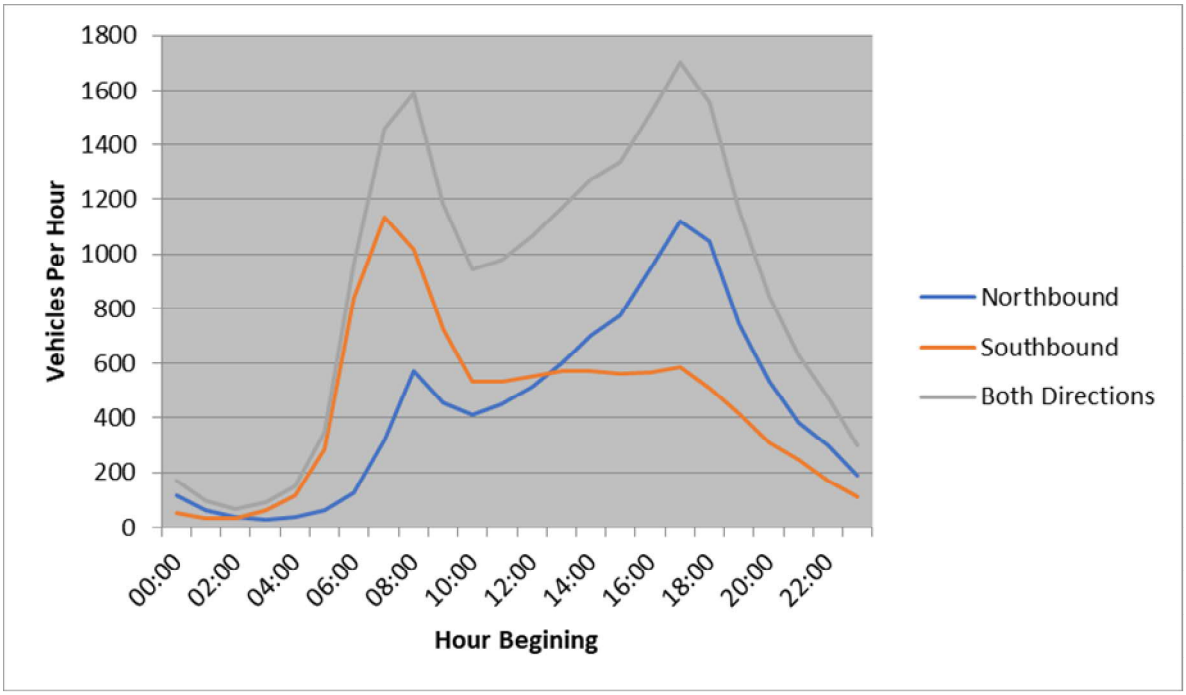


Figure 2.2 Julianstown Average Weekday Traffic Profile

The morning traffic profile is shown on Figures 1.3 and Figure 1.4, showing the direction of vehicles at two junctions, linking the R132 to Bettystown and to Laytown, showing the southerly direction that vehicles travel. Figure 1.4 shows the cumulative vehicle count for southbound traffic between 8 and 9am, the morning peak time in 2018.

Figure 1.3: Southbound morning peak vehicle flow

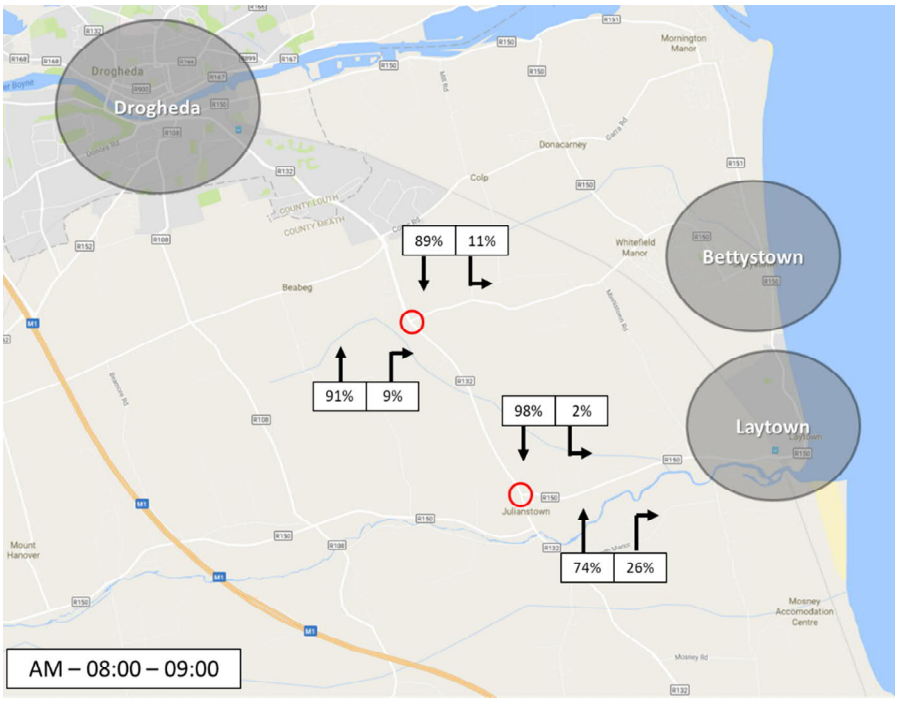
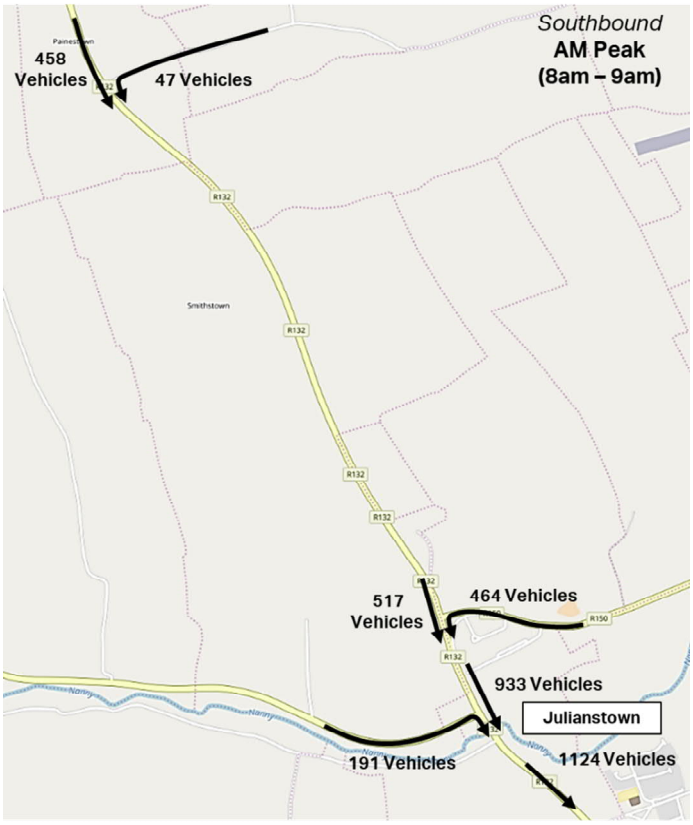


Figure 1.3: Southbound morning peak vehicle flow



Source Google, 2018

1.3. Objectives

Meath County Council wants to alleviate issues arising from high traffic volumes in Julianstown, which is suffering from noise, pollution and congestion. The preferred option also needs to:

- reduce journey time on the R132, thereby increasing journey time reliability;
- improve safety conditions for all road users, but particularly for active modes of transport (pedestrians and cyclists);
- contribute to health benefits, with reductions in air pollution, vibration and noise in Julianstown Village;
- improve resilience of transport network in north-east Meath and south Louth, given increased future demand on transport networks.

Several studies, technical reports and traffic modelling were completed between 2012 and 2018, identifying various options for relieving the traffic demand in Julianstown. These included:

Julianstown Assessment Technical Note for the NRA Traffic Management & Planning (AECOM, 2015)

M1 Junction 9 Slip Road Tolling Study Technical Note: (Roughan & O'Donovan and AECOM, 2012)

R132 Julianstown Assessment Technical Note (AECOM, 2017)

Technical Note 2 – M1 Junction 9 Toll Slips Review (AECOM, 201)

This report uses the traffic demand modelling undertaken in the above studies to assess the various options for relieving the traffic demand in Julianstown. This forms a preliminary assessment of Stage 1 Pre-Appraisal/Preliminary Appraisal requirements, of the DTTaS Common Appraisal Framework.

AECOM have not costed the proposed solutions in detail. Indicative construction costs based on historic costs (with a 25 per cent inflation allowance) for the options are used as estimates, given no detailed design is available at this stage. Several assumptions are made, to undertake this analysis.

2. Methodology & Assumptions

This section discusses the Options appraised, the rationale for their selection and the sources that were used to assess each Option. Traffic flows were modelled, using a Local Area Model, to see the effects of different options on traffic volumes in the AECOM 2015 study. This section elaborates on these options, noting that a local bypass of Julianstown emerged as the preferred options in these previous assessments. This preliminary assessment considers alternative modes of transport to alleviate the traffic volumes, but suggests that increased public transport will not achieve the objectives set out in 1.3. However, we do consider that a public transport option should be included in a more detailed appraisal, as this study did not include any public transport modelling component.

2.1. Options

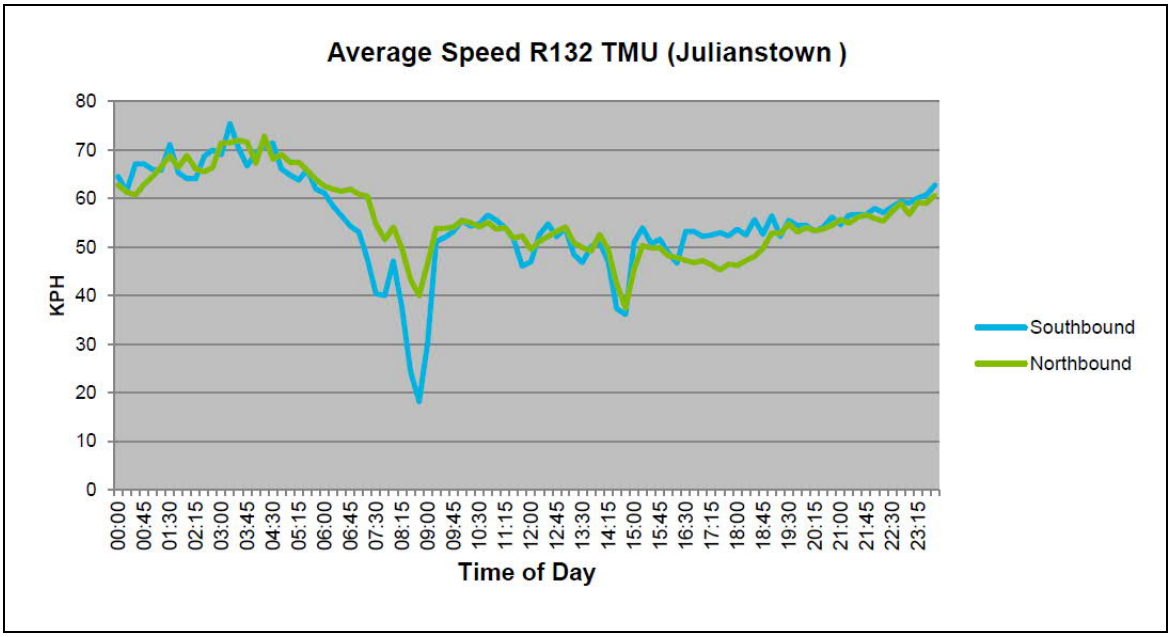
Five Options were selected for appraisal, including a 'do nothing' option. These are described below, with accompanying assumptions.

2.1.1. Option 1. 'Do Nothing'

The 'Do Nothing' option will not improve the traffic demand in Julianstown, with AADT levels at 20,472 and forecast to increase given the capacity for future development in the South Drogheda area. The R132 is the most direct and fastest route to the M1 for residents of southeast Drogheda and residents of Bettystown and Laytown. The population of this area has almost doubled since 2002. Current Census data shows that a significant portion of the additional residents in these areas now commute to the Dublin metropolitan area. The R132 is a rational choice for travel between these areas and Dublin.

The impact of school drop-offs, in combination with peak commuting traffic was assessed between the R132/R150 junction and the R132/Mosney Road junction (in AECOM Technical Note, November 2017). A comparison of journey times on this stretch of the R132 is shown in Figure 2.1. These observations indicate that journey times can increase by as much as 1 minute and 45 seconds during peak times on this 2.6km section of road.

Figure 2.1 Average daily speed of Julianstown traffic over 24 hours



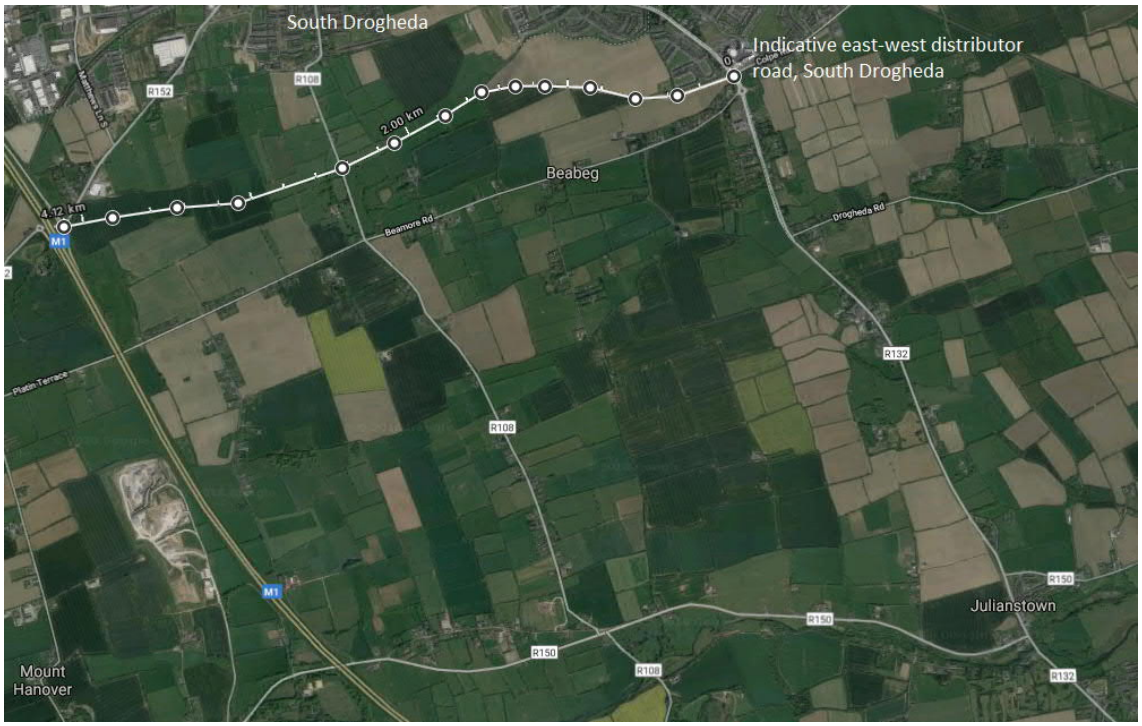
It is noted that planned investment will continue in the 'do nothing' scenario, including design changes in the village itself, and electrification of the northern commuter line from the existing end of the DART network in Malahide on to Drogheda. The passenger load of the combined Drogheda, Bettystown and Laytown stations are estimated to increase to 1,900 by 2033 when the DART electrification is complete. The number of passengers boarding at Drogheda is expected to increase from 1,700 to 2,400. Despite offering more capacity on public transport, there is a significant amount of population and employment growth planned for south Drogheda, and overall, a 'do nothing' approach will likely see the traffic through Julianstown increase.

2.1.2. Option 2. East-west distributor road to the south of Drogheda

An indicative alignment for a standard single carriageway regional road is given in Figure 2.2. This is a 4.12km distributor road, intended to take traffic from South Drogheda to the M1. This was selected in the AECOM 2015 study, as it was included in the land use zoning objectives map of the Meath County Development Plan. We assumed that the new distributor road would be single carriageway. We used indicative construction and land costs, based on previous scheme construction costs estimates and previous scheme land and property cost estimates for a distributor road in the Greater Dublin area, but stress that a more considered appraisal of the actual costs should be undertaken in ensuing appraisals at later Stages.

The indicative figures used for land is €0.92 million per km of road built, and construction costs are €3.36 million per km of single carriage road constructed. We assumed an annual maintenance cost of €20,000 per km of new road after construction. The timeframe chosen to measure benefits of the investment was 60 years, discounted at 5 per cent per annum as per the Public Spending Code.

Figure 2.2 Indicative east-west distributor road, South Drogheda



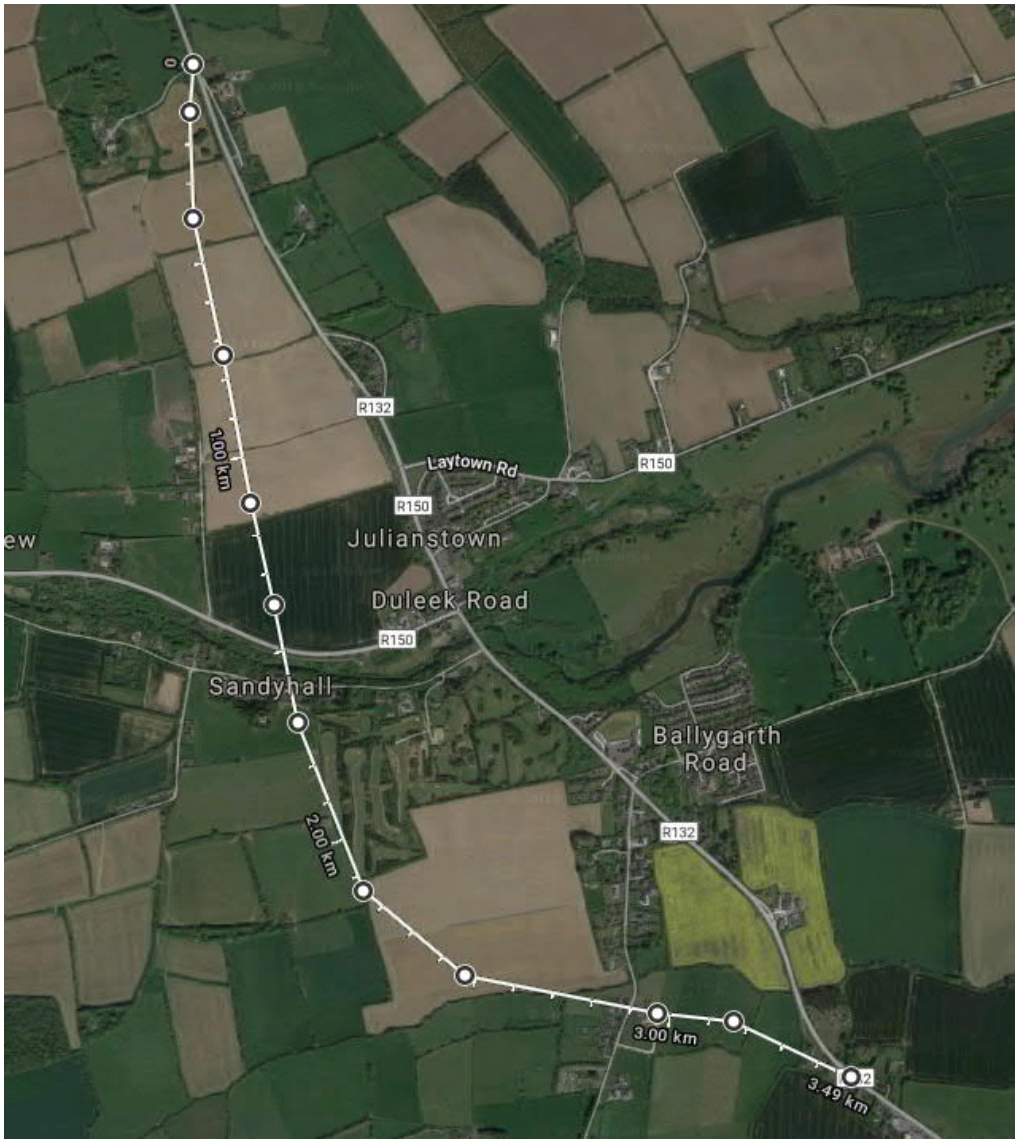
The traffic modelling undertaken to assess this scenario showed a displacement effect of traffic from the existing Junction via the R152 to the new south Drogheda distributor road. There was no change on traffic volumes through Julianstown, and minimal effects on total vehicle-km travelled and time spent travelling (drops of 0.05% and 0.31% respectively). A very small positive impact on M1 Tolls (between Junctions & and 8) resulted, an annual increase of 0.1 per cent.

As the South Drogheda distributor road does not alleviate the traffic volumes in Julianstown, it is suggested that it should not be considered further, for more detailed appraisal.

2.1.3. Option 3. Bypass of Julianstown

An indicative alignment for a standard single carriageway regional road is given in Figure 2.3. Arguably, given the current traffic volumes in Julianstown, a dual carriageway option should be explored in future appraisal, and the location and interaction with the R150 Laytown road should be given further consideration. This indicative road reduces the majority of traffic from the existing R132 through Julianstown. Modelled AM peak traffic fell from 1,525 vehicles per hour in the base or 'do nothing' scenario to 284 vehicles per hour. This is a reduction of 82 per cent of the traffic volume through Julianstown.

Figure 2.3 Indicative Bypass of Julianstown

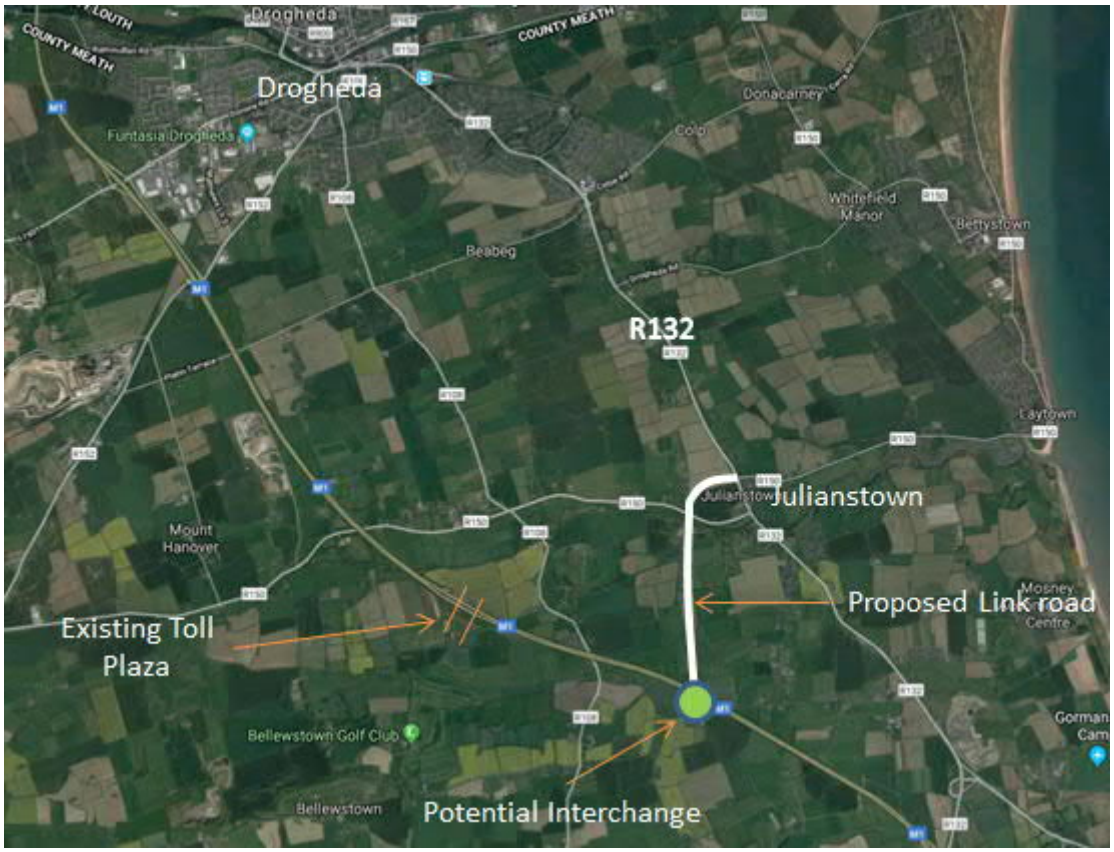


As per Option 2, the same indicative figures land and construction cost figures were used: land is €0.92 million per km of road built, and construction costs are €3.36 million per km of single carriage road. We assumed an annual maintenance cost of €20,000 per km of new road after construction. The timeframe chosen to measure benefits of the investment was 60 years, discounted at 5 per cent per annum as per the Public Spending Code.

2.1.4. Option 4. New Link road from the M1 (north of Junction 7)

The third new road solution for Julianstown traffic that was considered was a Link road, extending from the R150 Laytown junction (at north end of Julianstown) to the M1. This would require a new connection on the M1, and is estimated to be 2.18km in length.

Figure 2.4 Link road with new interchange on the M1



Modelling suggested that this road would take 25 per cent of Julianstown through traffic only. It would also have a displacement effect on M1 traffic, with an increase usage of this road as a route to Drogheda, enabling the avoidance of tolls at the current location of the Plaza between junctions 7 and 8.

2.1.5. Option 5. Invest in other modes of transport

The assessments undertaken by AECOM for TII and the NTA to date were focused on road solutions to the traffic volumes in Julianstown. After calculating the cost of constructing the bypass – the preferred option in the previous studies – the option of investing that level of expenditure into public transport was explored. This was an iterative process, with the option qualitatively constructed after the costs for the three road construction options were undertaken. Note, no transport model was used for this Option analysis, and the scenario is built upon existing transport mode patterns and information available on modal shift patterns.

Drogheda and Julianstown are serviced by the Route 101 Bus Eireann bus service, with approximately 40 buses servicing the route per day. The route operates every 20 – 30 minutes from Drogheda bus station to Talbot Street in Dublin City Centre utillising the R132 road for a large portion of its journey.

The northern railway line runs to the east of Julianstown, through Laytown and onto Drogheda. With the electrification of the DART line to Drogheda, a modal switch is expected, with a 46 per cent increase in DART usage coupled with an 11 per cent decrease in regional buses. The expected increase for the Drogheda/Laytown southbound DART is from approximately 1,500 passengers in one morning hour to 3,060, with the new electrified service.

As per Table 2.1 below, there is a higher dependence on the car to get to work for the people of Julianstown, Bettystown, Laytown and Drogheda than the national average. Once school trips are included, the public transport share increases above the national average for the three areas, indicating a higher reliance on public transport for school journeys.

Table 2.1 Mode of Transport to Work and Work & School trips combined

	Work trip only		**Work and school trips combined**	
	Car	*PT*	*Car*	*PT*
Julianstown	78%	8%	58%	18%
Bettystown/Laytown	68%	15%	58%	23%
Drogheda	63%	9%	54%	14%
All of Ireland	62%	9%	58%	13%

PT = Public Transport and includes private coach or minibus

Source Census 2016 POWSCAR data

For this option, we considered building a Park&Ride bus stop, with a dedicated Peak Time express service to Dublin Airport and to Dublin city centre.

It is not possible to give a definitive answer to potential modal shift to public transport (as this was not been modelled to date). However for the purpose of this scenario, we assume that a "minor modal shift could occur" and have made an assumption of a range of between 1 and 3 percent modal shift to public transport for this scenario. We expect the modal shift to be minor as there are existing bus and rail services. While some corridors are an exception, the majority of the Greater Dublin Area bus network is characterised by fragmented bus priority, frequent delays and unreliable services, which limit its appeal. Further traffic modelling is required to appraise this option.

2.2. Methodology

As indicated in the project background, this report has adopted a methodology compliant with the Public Spending Code and Common Appraisal Framework.

The Order of Magnitude Costs of proposed Options exceeds €5 million for alleviating the traffic problems in Julianstown but is below the €20 million threshold mandating a full Cost-Benefit Analysis or Cost-Effectiveness Analysis. Note that these figures are indicative, as the route selection and design are not determined at this point. The process of elimination of options was undertaken using a preliminary Multi-Criteria Analysis in this case. As Multi-Criteria Analysis assesses qualitative outcomes, a common scale is required to allow a level of comparability between various outcomes. The seven-point scale is from Project Appraisal Guidelines to fulfil this function, and colour coded to add further clarity (Table 2.1).

Table 2.1: Qualitative Rating Scale

Description of effects	Score
Major or Highly Positive	7
Moderate Positive	6
Minor or Slightly Positive	5
Not Significant or Neutral	4
Minor or Slightly Negative	3
Moderately Negative	2
Major or Highly Negative	1

Source: Transport Infrastructure Ireland (2017)

Multi-Criteria Analysis will be supplemented with the calculation of the Economic Net Present Value (ENPV) for each option in order to fulfil economic analysis requirements. Financial Analysis is to be completed per evaluation guidelines; this will be satisfied through the calculation of the Financial Net Present Value (FNPV). Sources of Funding Analysis will not be carried out in this case as the project is expected to be solely funded by the exchequer.

2.3. Assumptions

A number of assumptions are required to carry out an economic appraisal. Many of these assumptions such as discount rates are by the Department of Public Expenditure and Reform. A summary of assumptions adopted for this project are identified in Table 2.2.

Table 2.2: Appraisal Assumptions

Description	Relevance	
Discount Value	Discounting future values to take into account the time preference of money	5%
Construction Period	Period in which an asset is being constructed or prepared, prior to entering its useful economic life	1 Year
Construction Costs	Risk of cost inflation, or uncertainty of costs, at this preliminary phase	25%
Maintenance Costs	Ongoing costs after road is complete	€20,000 per km
Useful Economic Life: Roads	Economic Appraisal/Financial Appraisal	60 Year
Time Savings	In-work and commuter values of time as described in CAF and inflated by a productivity index	-
Conversion of AM peak hour model data to annual data	Assumption that benefits of options accrue in 6 hour timeframe only, for 253 working days in the year	1518 factor

Source: AECOM (2018)

This section has introduced the options, introduced the appraisal methodology, and described the assumptions used for this report. This information underpins the findings of the next three sections:

- Multicriteria Analysis
- Financial Appraisal
- Economic Appraisal.

3. Multicriteria Analysis

Multi-Criteria Analysis is an appraisal tool used to evaluate alternatives based on the identified criteria, ranked on the basis of an aggregation procedure. The appraisal criteria are made up of economic, safety, environment, accessibility and social inclusion, integration and physical activity components. There are appraisal sub-criteria associated each criteria category. The ranking system is on a Likert scale, between 1 and 7; ranging from highly negative (score of 1) to highly positive (score of 7).

Figure 3.1 Preliminary Multi-Criteria Analysis for Regional and Local Road Capital Projects – Appraisal Criteria, Sub-Criteria and Objectives

Appraisal Criteria	Appraisal Sub-Criteria	Objective
Economy	Transport Efficiency and Effectiveness	Reduce journey times? Sufficient cross section provided?
	Wider Economic Impact	Improve economic performance of area, e.g. reduce transport costs
	Transport Reliability and Quality	Improve journey time reliability, e.g. improve Urban Congestion, provide missing link to maximise return on investment
Safety	Collision Reduction (PIA/mvkm)	Reduce collision rate using RSA collision database for subject road section
	Security	Improve safety conditions for all road users, e.g. lighting, pedestrian crossing
Environment	Air qulaity	Impact on Emmissions
	Noise and Vibration	Impact on road related noise and vibration
	Landscape and Visual Qty	Impact on heritage sites
	Biodiversity	Impact on biodiversity, e.g. Natura site / a particular habitat
	Cultural, Archaeological , Architectural Heritage	Impact of scheme on Archaeological sites or national monument
	Land Use	Impact on agricultural holdings/ farm severance
	Water Resources	Impact on water courses
Accessibility and social inclusion	Vulnerable groups	Impact on accessibility to key facilities, such as employment, education and healthcare for all road users, but in particular vulnerable groups
	Deprived Geographical area	Impact on accessibility to deprived areas e.g. a particular Rapid or CLAR area
Integration	Transport Objectives	Connectivity to NR's, Ports, Airports, Railways
	Land Use Integration	To meet Transport Objectives, e.g. planning documents, local, county, regional, national
	Geographic Integration	Enhanced regional accessibility and Connection between towns flagged in Nat planning Document
	Integration with other Governemnt Policies	Scheme supports Govt policy e.g. strengthen rural economies and communities
Physical Activity	Opportunities for pedestrians and cyclists	Enhancements for pedestrians and cyclists e.g. footpaths, wider Hard shoulder

The output of AECOM's MCA analysis for the five options under assessment is presented in Figure 3.2.

Option 1, 'Do Nothing' option is not a tenable option in this analysis, scoring negatively on most sub criteria. The combined score for this option is 59. This was the only option that did not have a positive impact. A negative scenario is any which scores less than 76.

Option 2, the 'South Drogheda distributor road' scored positively on the economic indicators, but was neutral in terms of most other appraisal criteria. This option scored a combined value of 80.

Option 4, 'Link road from M1 to R132', scored positively on Economy criteria, signifying an ability to relieve the traffic volumes passing through Julianstown, thereby improving physical activity opportunities in the village itself. A positive score on the accessibility criteria was due to the ability to alleviate congestion in and around the school.

Option 5, 'Public transport investment' was neutral for most categories, but scored highly for the Integration criteria, and alignment with wider societal transport goals. It did not improve the Economy criteria significantly, as there is not enough information to assess the potential impact on traffic through the village. However, investment in additional public transport was considered to have limited transport efficiency on its own; busses share the existing road network. We suggest that this option is explored in more detail in subsequent appraisal stages.

Option 3, 'Local bypass' attained the highest score out of all the options. It had positive values for economy, safety and environment. It was the option with the greatest ability to relieve the traffic volumes travelling through Julianstown. It also scored highly on noise and vibration reduction in the village, and on heritage values (as it enabled other heritage objectives to be pursued). This option scored negatively for land use, as all the 'do something' options did. It scored negatively on the transport objectives, as it does not reduce dependency on private vehicles.

Note biodiversity and water resources criteria were not considered in great detail in this preliminary appraisal, given that all the routes and options are indicative. It is noted that the River Nanny Estuary and Shore Special Protection Area lies to the north-east of Julianstown.

It is clear from this analysis that the preferred Option 3 has the most beneficial outcomes. Option 4 improves the core objective of traffic alleviation in Julianstown, while Option 5 requires more detail to assess the extent of achieving traffic alleviation objectives, but scores highly in terms of broader societal objectives. Option 2 marginally improves traffic volumes across the modelled network, but did not improve Julianstown traffic, and did not score positively on other criteria. Option 1, do nothing, is the only option that led to negative outcomes, with increasing traffic pressure in Julianstown, with accompanying associated negative effects.

Multicriteria Scoring for five options

Appraisal Criteria	Appraisal Sub-Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
		Do Nothing	East west distributor road, south of Drogheda	Local Bypass	New link road from M1 to R132, north of Julianstown	Public transport investment
Economy	Transport Efficiency and Effectiveness	2	5	7	5	4
	Wider Economic Impact	3	5	5	5	4
	Transport Reliability and Quality	3	5	5	5	5
Safety	Collision Reduction (PIA/mvkm)	4	5	5	4	4
	Security	3	4	7	5	5
Environment	Air quality	3	5	5	4	5
	Noise and Vibration	2	4	7	5	4
	Landscape and Visual Qty	3	4	5	4	4
	Biodiversity	4	4	4	4	4
	Cultural, Archaeological , Architectural Heritage	2	4	6	4	4
	Land use	4	3	3	3	3
	Water resources	4	4	4	4	4
Accessibility and social inclusion	Vulnerable groups	3	4	6	5	4
	Deprived Geographical area	4	4	4	4	4
Integration	Transport Objectives	2	4	3	4	5
	Land Use Integration	3	4	5	5	7
	Geographic Integration	3	4	4	4	7
	Integration with other Government policies	4	4	5	4	4
Physical Activity	Opportunities for pedestrians and cyclists	3	4	5	5	5
	Total MCA Score	**59**	**80**	**95**	**83**	**86**

Ranking system

7=Major or highly positive	6=Moderately Positive	5=Minor or slightly positive	4=Not significant	3=Minor or slightly negative	2=Moderately negative	1=Major or highly negative

4. Financial Appraisal

A preliminary financial appraisal of the new roads was undertaken. The purpose of this is to weigh up the likely costs and benefits of a project before deciding on the correct course of action.

Financial appraisal includes the calculation of the net cash flows over the economic life of the asset. Financial flows will be discounted to account for the time value of money. Sources of funding analysis will not be completed. The indication to AECOM is that full funding will be sought from the exchequer.

Financial evaluation is used in the private sector to inform investment decisions. Within the public sector, the role of financial evaluation is less pronounced. As financial appraisal only considers monetary flows, it fails to capture the non-monetary objectives of the public sector. It therefore has limited potential to determine whether a project is socially valuable. Despite these drawbacks, financial analysis is useful to the exchequer as a budgetary planning and management tool.

4.1. Investment Costs

Construction costs per km of road built were used for the indicative routes identified in the options. These costs were taken from the recent construction of a distributor road in the Greater Dublin Area. We stress these costs are indicative only. A cost price inflation factor of 25 per cent was included, to allow for the uncertainty of these figures, and given that no design specifications are available at this point. These figures are shown in Table 4.1

Table 4.1: Investment Calculations, Nominal, 2018 €million

Option	Construction Costs (2018€ million)	Land and Property Costs (2018€ million)	Total (2018€ million)
Option 1 a 'do nothing', or baseline scenario/option			
Option 2 east-west distributor road to the south of Drogheda	13.84	4.73	17.75
Option 3 local bypass of Julianstown	14.66	4.01	18.67
Option 4 new link road from the M1 to the R132 north of Julianstown	9.11	2.49	11.60
Option 5 investment in other transport modes	unknown	2.5	Unknown

Source: AECOM (2018)

Options 2 to 4 result in a net increase in road surface area, so an increase in annual operating/maintenance costs of €20,000 per kilometre was included.

Revenues

The 2015 transport modelling of the three road options identified revenue impacts on the M1 toll road. These revenues were included in the financial analysis, but excluded from the economic analysis. For the South Drogheda distributor road and the Julianstown bypass, M1 Toll revenue increased marginally. The new link road from north of Julianstown to the M1 (including a new junction, south of the toll gates) could result in 5 per cent drop in toll revenue. This is because it enables toll avoidance via the new link road – the road would not have the time delays that the current R132 has, and would be more attractive for more Drogheda traffic.

Table 4.2 Modelled revenue impacts at M1 toll plaza

	Base	Option 2	Option 3	Option 4
AM Peak Traffic Flow (vehicles per hour)	2,330	2,333	2,337	2,221
Annual Average Daily Traffic	72,066	72,145	72,315	68,341
Annual Revenue Estimate	€26.3 million	€26.3 million	€26.4 million	€24.9 million
% Change		+0.1%	+0.3%	-5.2%

No other revenue impacts were identified or analysed at this preliminary stage.

Financial Net Present Value (FNPV)

Financial Net Present Value (FNPV) is the sum of discounted net economic flows over the appraisal period. The purpose of this metric is to estimate the total net monetary cost of a project over an appraisal period.

As the justification of most publicly constructed roads is primarily on economic grounds, and not financial, it is not surprising that the options resulted in negative FNPV. However, the FNPV for the new link road significantly spirals, given the toll avoidance that would result in lost income to the M1 public private partnership.

Table 4.2: Financial Net Present Value Calculations after 60 years, Discounted

Option	€m
Option 1 a 'do nothing', or baseline scenario/option	0
Option 2 east-west distributor road to the south of Drogheda	-€18.571 million
Option 3 local bypass of Julianstown	-€17.829 million
Option 4 new link road from the M1 to the R132 north of Julianstown	-€33.016 million

Source: AECOM (2018)

In conclusion, this section has estimated the budgetary implication of the three new road options proposed. Options 2 and 3 have a moderate negative FNPV, whereas the negative revenue impacts of option 4 are likely to rule it out for further consideration.

5. Economic Appraisal

The purpose of this section is to weight up the economic costs and benefits of a project before deciding on the correct course of action. Following on from the qualitative outcomes identified in the Multi-Criteria Analysis in the previous section, this financial and economic appraisal elaborates the options using preliminary quantitative data.

Quantitative outcomes will be captured through the calculation of an Economic Net Present Value (ENPV). Values will be represented incrementally versus the 'Do Minimum'. Calculations include construction and upkeep costs for the infrastructure along with projected benefits arising for projected commuter time savings and vehicle operating costs.

Economic evaluation is a technical exercise, care and attention is required so that errors such as double-counting, incorrect use of parameters and estimation inaccuracies are minimised. As the intended purpose of this report is for preliminary analysis only, we suggest that further work will be required to explore some of the parameters where full data was not available. We highlight these data and knowledge gaps.

Ultimately, economic evaluation requires the forecasting of future activity, which may yield mixed results. Every effort has been made to ensure that future forecasts within this report are as robust as possible and adhere to official evaluation guidelines.

Time Savings

Transport projects typically incorporate time savings as an economic benefit, and typically account for a significant share of the benefits. Values of time vary according to journey purpose. Benefits amount to an aggregation of time savings across many users. Construction of the three new road options all led to AM peak time savings. For the south Drogheda distributor road, this time was a total of 47 hours (accrued in a one hour modelled period). The figure for the Julianstown bypass was a saving of 118 hours, and for the Link road, a saving of 149 hours travelled. No data was available on time savings for the public transport option, however it is noted that it is unlikely that benefits for bus travel time would be realised under a 'do nothing' situation, as the buses share the roads with existing traffic. More data is needed on the effect of time savings if a dedicated bus lane were added onto any of the new roads.

Economic Net Present Value (ENPV)

Economic Net Present Value (ENPV) is the sum of discounted net economic and financial flows over the appraisal period. The purpose of this metric is to estimate the total economic net benefit of a project over an appraisal period accounting for the time value of benefits. These are discounted values, given the time-preference of money, with higher values in the near future.

Table 5.1: Economic Net Present Value Calculations, Discounted

Option	Economic Net Present Value €m	*(of which, discounted total costs €m)*
Option 1 a 'do nothing', or baseline scenario/option	0	*0*
Option 2 east-west distributor road to the south of Drogheda	€23.45	*€19.2*
Option 3 local bypass of Julianstown	€85.74	*€19.3*
Option 4 new link road from the M1 to the R132 north of Julianstown	€126.43	*€11.8*

Source: AECOM (2018)

This economic appraisal differs from the financial appraisal as it includes non-monetary flows. In particular, it is based on the time benefits that result from the options considered. The results will help steer the option selection decision. Option 4, the new link road has the highest ENPV, given that this option has the greatest time and kilometre savings of the three options. This is despite the loss of revenue to the M1 tolls – indicating that there is a significant behavioural change regarding route, under this scenario.

6. Conclusions

A 'do nothing' option is not considered tenable, given the qualitative scoring of the multi criteria analysis. 'Do something' options have a range of merits. The link road from the north of Julianstown to a new junction on the M1, south of the toll plaza reduced Juliantown's traffic congestion by 25 per cent only, but had the greatest time savings of the three road options analysed. However, it had high financial impact, with the loss of toll revenue and the diversion of traffic through the new link road. The South Drogheda distributor road had the lowest benefit to cost ratios out of the appraised road options.

Option 3, the bypass of Julianstown emerged as the preferred option in both the Multi-criteria Analysis and preliminary cost benefit analysis, although it should be noted that the public transport investment option was not fully costed at this time.

		Options/Scenario				
Category	Criteria Description	I	II	III	IV	V
Economy	**Transport Efficiency and Effectiveness:** Reducing journey times	2	5	7	5	4
	Wider Economic Impacts: Reducing transport costs	3	5	5	5	4
	Transport Reliability and Quality: Improving congestion	3	5	5	5	5
Safety	**Collision Reduction:** Road Safety Authority guidelines	4	5	5	4	4
	Security: Removing safety issues for all road users	3	4	7	5	5
Environment	**Air Quality**: Removes emissions from urban environment	3	5	5	4	5
	Noise and Vibration: Removes noise and vibrations from Village.	2	4	7	5	4
	Landscape and Visual Quality:	3	4	5	4	4
	Biodiversity: Natura 2000 sites, particular habitats.	4	4	4	4	4
	Cultural, Archaeological, Architectural Heritage:	2	4	6	4	4
	Land Use: Impact upon existing land uses	4	3	3	3	3
	Water Resources: Effect on water courses	4	4	4	4	4
Accessibility & social inclusion	**Vulnerable Groups:** access to schools	3	4	6	5	4
	Deprived Geographical Area: n/a	4	4	4	4	4
Integration	**Transport Objectives:** Strategic Connectivity	2	4	3	4	5
	Land Use Integration: Local planning objectives	3	4	5	5	7
	Geographic Integration: Enhanced regional accessibility	3	4	4	4	7
	Integration with other Government policies: Compatibility with wider policy	4	4	5	4	4
Physical Activity	**Opportunities for pedestrian and cyclists**	3	4	5	5	5
Benefit to Cost Ratio	30 Year Appraisal		1.56	3.9	3.35	Not
	60 Year Appraisal		2.25	5.8	4.28	calculated